

CHEMISTRY, THE SCIENCE OF MATTER
Chapter Outline**1.1 → The Puzzle of Matter***Vocabulary*

chemistry	matter	mass
property	scientific model	qualitative
quantitative	substance	mixture
physical change	physical property	solution
alloy	solute	solvent
aqueous solution	element	compound
formula		

Objectives

- **Classify** matter according to its composition.
- **Distinguish** among elements, compounds, homogeneous mixtures, and heterogeneous mixtures.
- **Relate** the properties of matter to its structure.
- **Apply** the appropriate technique(s) to separate a mixture into its components.

1.2 → Properties & Changes of Matter*Vocabulary*

volatile	density	chemical property
chemical change	chemical reaction	energy
law of conservation of mass	exothermic	endothermic

Objectives

- **Distinguish** between physical and chemical properties.
- **Contrast** chemical and physical changes.
- **Apply** the law of conservation of matter to chemical changes.

Chemistry 313 - Chapter 1 Calendar (September 4-October 1)

2	3	4	5	6	7
		First Day of Classes	Activity: Multiple Inte	Overview Lab Safety	Activity: Math Lab Due Lab Safety Co Due Syllabus out b
9	10	11	12	13	14
	Notes: Scientific Me Pre-Lab: Milk Lab	Lab: Milk Lab Post-Lab: Milk Lab	Activity: Identifying P Due: Homework #1 Notes: Properties o	Activity: Separation of a Mixture Notes: Mixtures and	
16	17	18	19	20	21
	School Holiday		Demonstration: Ind Notes: Substances Pre-Lab: Chemical	Due: Homework #2 Lab: Chemical Cha	Due: Homework #3 Post-Lab: Chemura Quiz: Chapter 1-1
23	24	25	26	27	28
	Notes: Properties e Practice: Density Pr	Activity: Density Due: Chemical Cha Due: Homework #4	School Holiday	Chapter 1 Menu Da	Due: Homework Pa Section 1.3-1.4 Hor Study Guide Day
30	Oct 1	2	3	4	5
	Activity: Review Stat Due: Chapter 1 Stu Review: Chapter 1-1	Test: Chapter 1	Activity: Mini Metric Olympics		Notes: Metric Units Practice: Metric Con

CHEMISTRY, THE SCIENCE OF MATTER

Warm-Ups & Exit Tickets

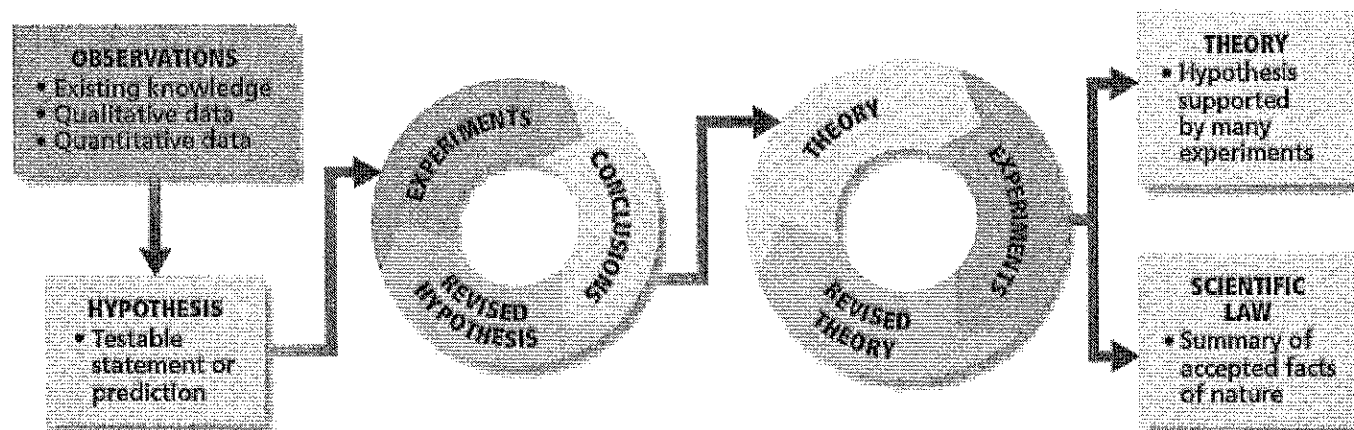
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CHAPTER 1 NOTES

Chemistry: The Science of Matter

The Scientific Method



- The _____ is the systematic approach used in scientific study.
 - _____: is the act of gathering information by using your senses on a macroscopic level.
 - _____: is a testable prediction used to explain an observation (if, then).
 - _____: is a set of observations used to test a hypothesis.
 - Control, independent variable, dependent variable
 - _____: addresses whether or not the hypothesis is supported by the results found.
 - _____: is an explanation based on many observations and supported by the results of many experiments.
 - _____: is a fact of nature that is observed so often that it is accepted as the truth.

Matter & its Properties

- _____ is the science that investigates and explains the structure and properties of matter.
 - _____ is anything that takes up space and has mass.
 - _____ is the measure of the amount of matter that an object contains.
- The _____ of matter describe the characteristics and behavior of matter, including the changes that matter undergoes.

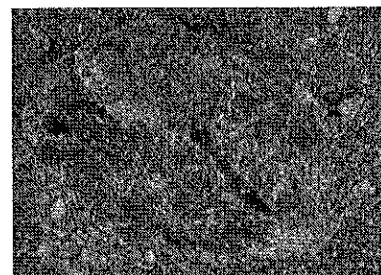
Example

- Characteristics that a sample of matter exhibits without any change in its identity.



Example

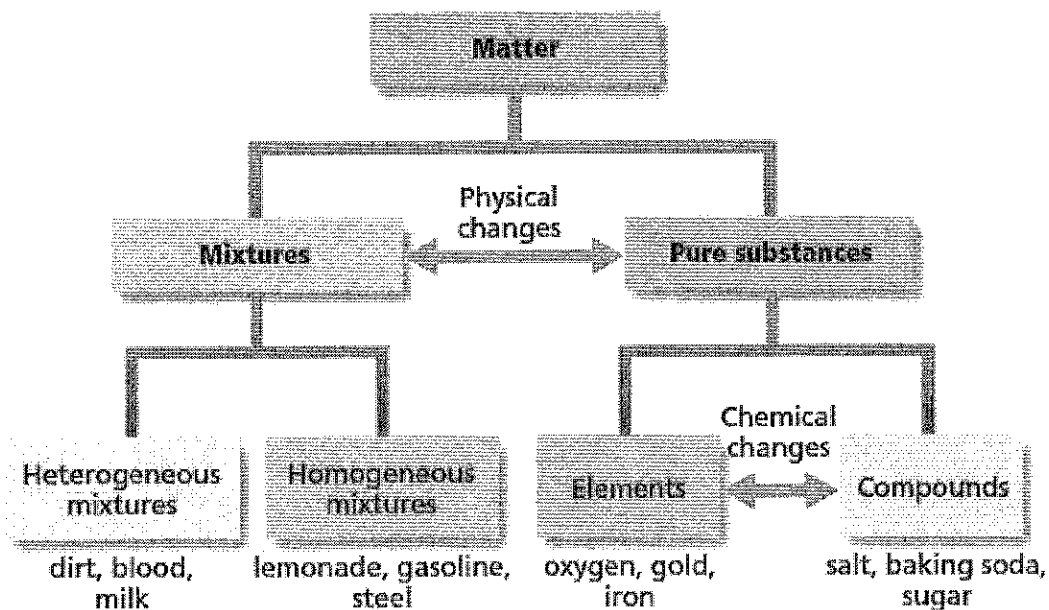
- The ability of a substance to combine with or change into one or more other substances.



Properties of Copper	
Physical properties	Chemical properties
<ul style="list-style-type: none"> • Reddish brown, shiny • Easily shaped into sheets (malleable) and drawn into wires (ductile) • Good conductor of heat and electricity • Density = 8.92 g/cm^3 • Melting point = 1085°C • Boiling point = 2570°C 	<ul style="list-style-type: none"> • Forms green copper carbonate compound when in contact with moist air • Forms new substances when combined with nitric acid and sulfuric acid • Forms a deep blue solution when in contact with ammonia

- | | |
|--|--|
| <hr/> <ul style="list-style-type: none"> Matter that is large enough to be seen. <hr/> | <hr/> <ul style="list-style-type: none"> Matter that cannot be seen with the naked eye. <hr/> |
| <hr/> <ul style="list-style-type: none"> An observation that can be made without measurement. <hr/> | <hr/> <ul style="list-style-type: none"> An observation that uses measurement. <hr/> |

Classifications of Matter



Mixtures & Physical Changes

- A mixture with different compositions.
- An observation that uses measurement.
 - It is also referred to as a _____.
- Types of Solutions...
 - Solid Solutions:
 - _____ are solid solutions that contain different metals and sometimes nonmetallic substances.
 - Liquid Solutions:
 - The _____ is the substance that is being dissolved.
 - The _____ is the substance that does the dissolving.
 - When the solvent is water, the solution is called an _____.
- A _____ is a combination of two or more substances in which the basic identity of each substance is not changed.
 - Mixtures can be separated into its components by physical processes.
- Separation Techniques...
 - _____
 - Used to separate a mixture with widely varying particle size.
 - _____
 - Used to separate a liquid mixture.
 - _____
 - Used to separate an aqueous solution.
 - _____
 - Separates a mixture based on polarity.
- A _____ is a change in matter that does not involve a change in the identity of individual substances.
 - Matter exists in one of three states (_____, _____, or _____) depending on its _____.
 - Any change in state is a physical change.
 - If a substance is described as being _____, it becomes a gas easily at room temperature.

Substances & Chemical Changes

- This type of pure substance can be broken down into simpler substances.
- It is a chemical combination of two or more different elements joined together in a fixed proportion.
- This type of pure substance cannot be broken down into simpler substances.
- They are the simplest form of matter.

- Examples...

- What is the density of a piece of wood that has a mass of 25.0 grams and a volume of 29.4 cm³?

Formula: _____

Rearranged formula: _____

Plug-in numerical values with units:

Solve (answer): _____ Unit: _____

- I threw a plastic ball in the pool for my dog to fetch. The mass of the ball was 125 grams. What must the volume be to have a density of 0.500 g/ml? I want the ball to float, of course!

Formula: _____

Rearranged formula: _____

Plug-in numerical values with units:

Solve (answer): _____ Unit: _____

NAME: _____

SCORE _____/40
Chemistry 313
Chapter 1

CHEMISTRY, THE SCIENCE OF MATTER
Homework Assignment(s)

Homework #1 **Due:** _____

1. What is a scientific model? What are its steps? *3 points*
2. Jacques Charles described the direct relationship between temperature and volume of all gases at constant pressure. Should this be called Charles's law or Charles's theory? Explain. *3 points*
3. A report in the media states that a specific diet will protect individuals from cancer. However, no data are reported to support this statement. Is this statement a hypothesis or a conclusion? *1 point*
4. What is the difference between a hypothesis, a theory, and a law? *3 points*

Homework #2 **Due:** _____

1. What is chemistry? *1 point*
2. Define matter. *1 point*
3. List three properties of an orange. *3 points*

4. If you say that sulfur is yellow, you are stating a property of sulfur. What is meant by a property? Is color a physical or chemical property? 2 points

REVIEW OF CHEMISTRY, IN/ENGRD
(Homework Assignment)

5. How is a qualitative observation different from a quantitative observation? Give an example of each. 3 points

Homework #3

Due:

1. What is the solvent in an aqueous solution of salt? Why are aqueous solutions important? 2 points

2. Classify these as heterogeneous or homogeneous mixtures (solutions) 4 points

a. Salt water

b. Vegetable soup

c. 14-k gold

d. Concrete

3. What are the three states of matter? 1 point

4. Describe the separation technique that could be used to separate each of the following mixtures. 3 points

a. Two colorless liquids

b. A nondissolving solid mixed with a liquid

c. Red and blue marbles of same size and mass

Homework #4

Due:

1. Are the following examples of physical changes or chemical changes? 4 points

a. Water boils

b. A match burns

c. Sugar dissolves in tea

d. Sodium reacts with water

2. What is energy? What part does it play in chemistry? *2 points*

3. Is the overall processing of food in your body an exothermic or endothermic process? *1 point*

4. Name the elements contained in the following compounds. *3 points*

a. Sodium chloride (NaCl)

b. Ammonia (NH_3)

c. Ethanol ($\text{C}_2\text{H}_6\text{O}$)

Name: _____

SCORE _____

_____/15
Chemistry 313
Chapter 1

CHEMISTRY, THE SCIENCE OF MATTER
Study Guide

1. Define the following vocabulary terms.

a. alloy

b. aqueous

c. chemical reaction

d. chemistry

e. compound

f. density

g. element

h. energy

i. formula

j. law of conservation of mass

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b. _____

C. _____

d.

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5. Identify 3 qualitative and 3 quantitative properties in the following advertisement.

FOR SALE: A brand new 4-wheel drive Prius Hybrid! Gets great gas mileage, 34 miles per gallon! Includes black leather seats, air conditioning, and seats 5 passengers! Very environmentally friendly!

QUALITATIVE	QUANTITATIVE

6. Identify the following as either a physical or chemical change.

a. Sugar dissolving in a glass of iced tea

b. Recycling old aluminum cans to make new ones

c. A bomb exploding

d. Photosynthesis

e. Breaking a piece of glass

7. Write an example of an exothermic reaction and an endothermic reaction.

8. A spoonful of sugar with a mass of 8.8 grams is poured into a graduated cylinder. The volume reading is 5.5 mL. What is the density of the sugar?